COMMISSION INTERNATIONALE DE L'ÉCLAIRAGE
INTERNATIONAL COMMISSION ON ILLUMINATION
INTERNATIONALE BELEUCHTUNGSKOMMISSION

DIVISION 2 : PHYSICAL MEASUREMENT OF LIGHT AND RADIATION

Home Page: http://cie2.nist.gov

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June 15, 2001

Minutes of 2001 CIE Division 2 Meeting (DRAFT)

13:00 – 17:00 May 18, 2001 and 09:00 – 12:00 May 19, 2001
Gaithersburg, USA

Abbreviations:

AD:	Associate Director	NC:	National Committee
CIECB:	CIE Central Bureau	TC:	Technical Committee
CIEBA:	CIE Board of Administration	TCC:	Technical Committee Chair
CM:	Country Member	TR:	Terms of Reference
D2:	Division 2 (D1, D4, D8, likewise)	ST:	Status
DD:	Division Director	WG:	Working Group
ML:	Member List		

Attendees:

Carl Andersen	FHWA, USA
Jean Bastie	BNM-INM/CNM, France (CIE Vice President)
David Burns	3M, USA
Ellen Carter	Minolta Corp, USA
John Clare	MSL-N2, New Zealand
Dennis Couzin	Avery Dennison, USA
Gyula Dezsi	OMH, Hungary
George Eppeldauer	NIST, USA (TC2-48 Chair)
Arnold Gaertner	NRC, Canada
Teresa Goodman	NPL, UK (D2 Director)
Toni Gugg-Helminger	Gigahertz-Optik, Germany
Didier Halkin	Laborelec, Belgium

Jack Hsia	NIST, USA (Past CIE President)
Carolyn Jones	USA
Norbert Johnson	3M, USA (D2 AD)
Alan Kravetz	USA
Kohtaro Kohmoto	JELMA, Japan
Hideki Kondo*	Nihon Univ., Japan
Balázs Kránicz	Univ. Veszprém, Hungary
Thomas Larason	NIST, USA
Larry Leetzow	Magnaray Int'l, USA
Hans Allan Löfberg*	Univ. Gävle, Sweden (CIE President)
Cameron Miller	NIST, USA
Kathleen Muray	INPHORA, USA (TC2-45 Chair)
Thomas Nägele	Instrument Systems, Germany
Yoshi Ohno	NIST, USA (D2 Secretary, TC2-37, 49 Chair)
Justin Rennilson	RCS, USA (TC2-36 Chair)
Reiner Rattunde	LMT, Germany (TC2-40 Chair)
Maria Luisa Rastello	IEN, Italy (TC2-16 Chair)
Danny Rich	Sun Chemical, USA (TC2-39 Chair)
Georg Sauter	PTB, Germany (D2 AD, TC2-43, 50 Chair)
John Scarangello	LumiLeds Lighting, USA (TC2-46 Chair)
Janos Schanda	Univ. Veszprém, Hungary (CIE Secretary)
Jens Shuette	EBT Optronic, Germany
Raissa Stolyarevskaya	VNIIOFI, Russia
Guy Vandermeersch	Laborelec, Belgium (D2 AD, TC2-23, 52 Chair)
Pierce Webb	Eastman Kodak-retired, USA
Klaus Witt	BAM, Germany
Guanrong Ye	Zhejiang Univ., China
Joanne Zwinkels	NRC, Canada (TC2-25 Chair)

Total 40 persons from 13 countries, including 13 country members attended. Underlines indicate country members. * indicates substitutes for country member.

Handouts

Agenda of 2001 Division 2 meeting (Attachment 1)
List of the country members (Attachment 2), list of TCs and Reporterships
2000 Division 2 Activity Report

Opening

Division Director, Teresa Goodman, opened the meeting at 1 pm May 18, and welcomed everyone present. She introduced the CIE President, Hans Allan Löfberg, who was present at the meeting. President Löfberg, on behalf of CIE, thanked Yoshi Ohno and his colleagues at NIST for hosting ho sted this Division meeting and TC meetings, and for all the hospitality arranged by NIST. Goodman also thanked Yoshi Ohno for his hard work for preparing these meetings.

Goodman introduced the president of CIE-USA, Justin Rennilson, who was also present at the meeting. Rennilson mentioned that CIE-USA will be hosting next CIE Quadrennial

Session in San Diego from 25 June to 2 July 2003, and their preparation is well in progress. There will be a call for papers sent to national committees for distribution around November this year. The announcement and the details of 2003 Session will be posted on the CIE-USA website and other CIE websites. There will be a notification announcement around August next year.

1. Attendance list, apologies

Secretary received regrets from the following persons:

John Arens (USA)
Peter Blattner (Switzerland / CM)
Anton Bouman (Netherlands / CM)
Antonio Corrons (Spain / CM)
Jeanne-Marie Coutin (France)
K. Ganesha (India, TC2-24 Chair)
Neil Hodson (USA, TC2-32 Chair)
Rainer Kohler (BIPM, CCPR liaison)
Daniel Lozano (Argentina)
John Moore (UK, Editor)
Allan Ottosson (Sweden / CM) - H A Löfberg represents.
Jerzy Pietrzykowski (Poland / CM)
Alan Robertson (Canada)
Ichiro Saito (Japan / CM) - H Kondo represents.
Ian Tutt (UK, R2-25)

DD Goodman reported the recent, sudden death of Prof. Heinz Terstiege of Germany, who was very active in D1 and D2 for many years. The attendees observed a minute's silence in his memory.

2. Approval of Agenda

The agenda of 2001 Division 2 meeting, distributed to attendees and also via e-mail circular prior to the meeting, was approved with no changes.

3. Approval of the 2000 Div.2 meeting minutes

The minutes of the 2000 D2 meeting at NPL, Teddington, distributed via e-mail circular last year, were approved with no changes.

4. Director's Report (T. Goodman)

Division 2 organized two symposia this year, one on Uncertainty Evaluation held in Vienna in January and another on LED Measurements that took place in Gaithersburg just the previous week. Both Symposia were well attended to the extent that we had to decline some applications. As there seem to be continuing interest and high demands in both areas, D2 plans to organize both symposia again in the next few years. Goodman thanked Christine Hermann and her colleagues at CIE CB for hosing the Uncertainty

Symposium and Yoshi Ohno and János Schanda for organizing and hosting the LED Symposium.

Some issues from the Board meeting in June last year:

(1) The Board is trying to ensure that CIE continues to be relevant and to increase awareness of our activities.

(2) In order to achieve this, various initiatives are being discussed, such as changes to the ways that the CIE publications are produced and sold, holding increased numbers of symposia, improvements to the CIE website, development of distance learning packages, and increased focus on research activities in TCs.

(3) Awareness raising is to be carried out through the CIE brochure which has been recently developed and preparation of a booklet to describe CIE achievements, to emphasize impact that CIE has on industry.

(4) Divisions are being encouraged to have higher emphasis on research aspects in TC work. E.g., a lot of research work relevant to D2 TCs was presented and discussed at the LED Symposium. These research aspects should be more clearly emphasized and made visible, in order to attract new members into the CIE.

(5) CIE expects less reliance on revenue from publication sales in future and is therefore looking for other ways to bring in revenue. The next board meeting will be held 7 September 2001, and more ideas about future CIE activities are requested – please send to DD Goodman before 1 September 2001.

5. Secretary Report (Y. Ohno)

Secretary welcomed everyone to NIST, and thanked them for attendance to the D2 meetings as well as the LED symposium held in commemoration of the NIST Centennial. He also thanked CIE-USA for supporting the reception for D2 meeting participants to be held on May 18 at Holiday Inn.

(1) Symposium on Uncertainty Evaluation, Jan 22-24, 2001 at CIE CB
The Symposium was organized by DD Goodman with collaboration of AD Sauter and Secretary, and cooperation and hosting by CIE CB. The symposium was attended by over 60 participants.

(2) Symposium on LED Measurement, May 10-12, 2001 in Gaithersburg.
The symposium was organized by Secretary and J Schanda as co-chairs, and with cooperation by Christine Hermann and other staff at CIE CB for registration process and preparing handout materials. The symposium was attended by over 90 participants.

(3) Country members
Yugoslavia is added as a new D2 member, to make the total of 35 country members now. The country members of Japan, Thailand, and India have changed since the London meeting. The country member of Denmark has probably changed but not confirmed. See Attachment 2 for the current country members list.

(4) Reports issued

Secretary produced and circulated the minutes of 2000 D2 meeting on the website in October 2000. The 2000 Activity Report that also included the minutes of the D1 D2 Joint Meeting in London, was distributed via website at the end of April. The Secretary apologized for the delay of finishing these reports and will make sure to produce the minutes much faster next time.

(5) Division 2 Mailing List

The D2 mailing list now has 144 persons (last year – 138), which consists of country members (35), CIE and Division officers (17), TC chairpersons and reporters (28), former TC chairs (9), liaison from other organizations (5), and associates (63), with some overlaps among them. New persons are added as Secretary receives requests, most often after Division meetings and CIE Symposia. Among the 144 persons, 138 (96 %) now have email access, and just a few persons relying on fax and physical mailing. Most of D2 circulars are now distributed via e-mail only. Physical mailing is limited to those who have no email or fax, and for Activity Reports and other important circulars only.

(6) Division 2 Websites

The official D2 website is now http://physics.nist.gov/cie2. The CSIR site is tentatively closed as the Secretary has a technical difficulty to access files. The D2 website is updated every one or two months and more often before meetings. There is a page for TC draft documents where 10 drafts are now posted and accessed by one password. The decision at London meeting to install separate password for each TC has not been implemented due to some difficulty with current server operation, but there is another NIST server where this is conveniently done and direct access by Secretary is allowed. Secretary plans to move the D2 site to the new server after this Division meeting.

(7) E-mail reflector for D2

The e-mail reflector (cie-d2@nist.gov) has been used for a few years, mainly for circulars from Secretary but also occasionally for open discussions on some topics of common interest. A change has been made on this reflector so that replies to the message (circular from Secretary, e.g.) will go only to the Secretary and not to the entire list. The archive of the past messages (there is a link on the D2 main page) and subscriber list (occasionally circulated to D2 mailing list) are available.

(8) E-mail reflectors for TCs

Virtual meetings using email reflectors are encouraged. Currently we have email reflectors for TC2-45, 2-48, and 2-49, but so far these have not been much used. Email reflectors for TCs can be set up at NIST server on request sent to Secretary. (During this D2 meeting, requests from TC2-40 and 2-46 were received).

<Discussion>

Vandermeersch asked about criteria for the D2 mailing list as he finds some Belgian persons on the list who are not members of their NC. He suggests all subscribers should be members of NCs of CIE. Ohno answered that this is the same question as for the criteria for TC members, and is a difficult question. President Löfberg answered that it is a difficult question because CIE needs to draw on expertise from wherever this is available, which means that TC members are not necessarily NC members. However he also said it was important that country members should be notified when TC members from that country are appointed and they could then encourage these TC members to join

the NC. In fact, NCs should approve TC members from their country, but this guideline is not currently being strictly enforced. Rennilson commented that this problem has been raised at CIE-USA recently, and they are checking TC members from USA who are not members of CIE-USA and contacting them to urge them to become a member.
DD Goodman reminded those present of the two important issues raised in Secretary's report: 1) draft documents on the website, 2) D2 subscriber list, which were to be discussed in item 10 of the agenda

6. Editor's report (J. Moore)
DD Goodman relayed regrets from Editor Moore, who was unable to come this time. His written report was read as below.

(1) TC2-35
During the course of the ballot on the draft Standard by members of the Division and CIE BA, a number of detailed comments and objections were made which necessitated changes in the text. After some discussion, all the reservations expressed have now been satisfactorily resolved. CIE CB will shortly circulate the revised text to NCs, asking them to authorize the publication of the document as a CIE Standard. After this, the final stage will be the submission of the new CIE Standard to ISO for adoption as a joint ISO/CIE Standard.

(2) TC2-36
Publication CIE 54.2-2001 will be published within the next few weeks. It replaces and updates Publication CIE 54-1982. For the first time in a CIE document there will be 13 colour figures and the Editor has been involved in discussions between the TC and CIE CB to make sure that the introduction of colour was compatible with the existing system used to print CIE publications.

(3) Reports from other TCs
No new technical reports have been submitted to the Division Editor since the D2 meeting in Teddington last year. If any TC chairman wishes to have a report edited, Editor prefers to receive both a hardcopy (complete with all tables and figures) and a diskette copy of the file that produced it, preferably in a format compatible with Microsoft Word.
DD Goodman added that she would be glad to interface to Editor Moore as he has no email.

<Discussion>
Related to TC2-35, Schanda raised a problem in wavelength definition. This draft document, as well as CIE 15.2 and other old CIE publications, use standard air, whereas the CIE/ISO standard on colorimetric observers states wavelength in vacuum, which is causing inconsistency. Ohno added that all the past CIE documents on fundamental photometry and colorimetry, as well as the CIPM recommendation (BIPM Monography), state wavelength in standard air, and the change to vacuum was introduced only in the CIE/ISO 10526 and 10527 (1991). These documents came out of D1. According to his communication with Moore, the final document sent to ISO stated standard air, and the change was made by ISO during their acceptance process, which was never notified to CIE. Schanda suggests that D2 should take an action to make corrections to these

publications. Kondo suggested asking ISO172 committee on wavelength about any rules of ISO. DD Goodman also received a letter from Moore saying that he sent a letter to D1 Director raising this issue with his personal opinion that all wavelengths should be stated in standard air. The division members (and also all attendees for informal vote), voted with no objection to use standard air for all CIE publications - past and future. DD is to contact D1 on this issue and also request CIE CB to find out necessary steps to make corrections to the ISO/CIE standards.

7. Progress reports from Technical Committees, Reporters and Liaison persons

7.1 Technical Committees

Progress reports on the technical committees were given by
(1) AD Johnson on TCs 2- 17, 19, 25, 28, 30, 32, 35, 36, 39, 42, 44, 51
(2) AD Sauter on TCs 2-04, 16, 29, 37, 40, 43, 45, 46, 47, 48
(3) AD Vandermeersch on TCs 2-23, 24, 49, 50, 52,
and by the TC chairpersons who were present.
All the TC reports are combined and given below in the numerical order of the TCs.

TC2-04 Secondary standard sources
Chair: J. Moore (UK) **AD:** Sauter
ML: Bandyopadhyay (India), Corrons (Spain), Gaertner (Canada), Jiang (China), Low (USA), Metzdorf (Germany), Nishi (Japan), Schanda (Hungary)
TR: Produce a technical report on the selection and operation of stable secondary standard sources.
ST: Written report submitted from the TCC. The TC has approved the draft Technical Report, and the CIE CB will shortly be circulating it for ballot by Division members and CIE BA. As reported at earlier Division meetings, it was decided to restrict the sources dealt with in this Report to tungsten lamps only. To reflect this, the title has been changed to "The use of Tungsten Filament Lamps as Secondary Standard Sources". Modern scanning techniques have made it possible to include in the Report a number of photographs, although, to keep printing costs down, none of these is in colour. Because of the very small number of companies who are prepared to manufacture and supply the special lamps used as secondary standards, the TC has also decided to publish in the Report a list of all the manufacturers known at present to be producing and supplying such lamps.

TC2-16 Characterization of the performance of tristimulus colorimeters
Chair: M. L. Rastello (Italy) **AD:** Sauter
ML: Denner (South Africa), Goodman (UK), Hengstberger (South Africa), Moore (UK), Muray (USA), Ohno (USA), Rattunde (Germany), Robertson (Canada), Sauter (Germany), Schanda (Hungary), Steindl (Austria), Terstiege (Germany)
TR: To produce a report recommending methods for assessing the performance of tristimulus colorimeter heads for measuring chromaticity coordinates.
ST: Report given by the TCC. The TC met on May 18 at NIST prior to this Division meeting with 12 members and 21 guests. The 6th draft was distributed and

discussed. The current draft is mostly based on criteria defined in CIE 69. The TC agreed to try to publish the document with current contents and not to explore further methods for evaluation in various practical applications, which should be dealt with in a possible new committee. To finish up the document, an editorial WG is formed with members of Sauter, Schanda, Goodman, and the TCC. Next draft to be circulated for TC ballot.

TC2-17 Recommendation for integrated irradiance and spectral distribution of simulated solar radiation

Chair: D. Kockott (Germany) **AD:** Johnson

ML: Aydinli (Germany), Goodman (UK), Ignatiev (Russia), Justus (USA), Kaase (Germany), Kasten (Germany), Kok (South Africa), Wilkinson (Australia), Zerlaut (USA)

TR: Revise and update CIE Publication No.20 (1972)

ST: AD Johnson reported. He has received no reports from the chairman. This committee has not been active for the last a few years. There was an implication that Kockott retired but still active in D6 and ASTM committees. DD Goodman is to try to contact him by email and at coming D6 meeting.

TC2-19 Measurement of the Spectral Coefficient of Retroreflection

Chair: N. Johnson (USA) **AD:** Johnson

ML: Arens (USA), Brekke (Norway), Fisher (USA), Hsia (USA), Hubert (France), Kurioka (Japan), Price (UK), Rendu (France), Rennilson (USA), Richey (Germany), Schreiber (Germany), Sugiyama (Japan), Terstiege (Germany), Vandermeersch (Belgium)

TR: Identify the critical measurement parameters, tolerances, and requirements for, and conduct an international intercomparison of, the spectral coefficient of retroreflection.

ST: Report given by AD Johnson. The intercomparison is complete and the report will need only final editing. The report will be sent to Editor Moore and is expected to be published in CIE Collection.

TC2-23 Photometry of Street-Lighting Luminaires.

Chair: G. Vandermeersch (Belgium) **AD:** Vandermeersch

ML: Arens (US), Blaser (Switzerland), Blochouse (Belgium), Claassens (NL), Corrons (Spain), Price (UK), Rattunde (Germany), Rossi (Italy), Simons (UK), Sorensen (Denmark) - to be updated

TR: Prepare a technical report on the photometry of street lighting luminaires

ST: Report given by the TCC. The task of the committee is to provide recommendations on the specific photometric requirements related to the photometry of street luminaires. The document is to provide industrial laboratories with all the information they need, without searching for the work done in CIE D4. As within D4, the technical report CIE-140-2000 “Road lighting calculations” has been published, the TC has now the necessary base to start the job. The intention is to prepare an addendum to CIE publication 121 and will cover 1) photometric data, 2) photometric methods, and 3) uncertainties and tolerances. It will replace the old

publication CIE 27. The member list is to be revised. All experts in the photometry of street luminaires willing to participate may contact the chairman. A one and half day meeting is planned in Europe (Berlin or Brussels) for 8th and 9th October 2001.

TC2-24 Users guide for the selection of illuminance and luminance meters

Chair: K. Ganesha (India) **AD:** Vandermeersch

ML: Andor (Hungary), Arens (USA), Austin (USA), Bastie (France), Chang (Taiwan), Dibbern (Germany), Eppeldauer (USA), Gardner (Australia), Goodman (UK), Hengstberger (S. Africa), Moore (UK), Muray (USA), Ohno (USA), Rennilson (USA), Ritzol (USA), Sauter (Germany), Sojourner (USA)

TR: Prepare a user's guide for the selection and use of illuminance and luminance meters.

ST: A brief report from the TCC was received by Secretary by email on May 8. The TCC reports that the draft is under completion, with only two chapters remaining. He hopes to complete the two chapters by the end of June and try a virtual meeting. He has included the constructive suggestions sent by the members last year and made the contents more concise and simple.

TC2-25 Calibration Methods and Photoluminescent Standard for Total Radiance Factor Measurement

Chair: J. Zwinkels (Canada) **AD:** Johnson

ML: Bristow (Sweden), Erb (Germany), Leland (USA), McCamy (USA), Nayatani (Japan), Puebla (Germany), Racz (Hungary), Simon (USA), Witt (Germany), Verrill (UK)

TR: Prepare a CIE report on methods for measurement of total radiance factors of photoluminescent materials. Recommendations for realizing and calibrating photoluminescent standards by the one and two-monochromator methods will be included.

ST: Report given by the TCC. The TC met on May 19 for 3.5 hours at NIST, and discussed Draft 9 that was distributed on May 4. Discussion focused on terminology and notation. Several action items were identified and some members volunteered to send input for these by mid July. 10th draft is targeted for TC ballot in September this year.

TC2-28 Methods of characterizing spectrophotometers

Chair: Peter Clarke (UK) **AD:** Johnson

ML: Andor (Hungary), Bastie (France), Berns (USA), Distl (Germany), Eckerle (USA), Konstantinova (Bulgaria), McCamy (USA), Robertson (Canada), Sugiyama (Japan), Ulyanov (Russia), Zwinkels (Canada)

TR: Write a CIE report on the characterization of spectrophotometers by means of reference materials and other methods, with particular reference to linearity, wavelength error, stray light, and integrating sphere errors.

ST: Report given by Goodman. The draft was close to completion by former chairman J Verrill when P. Clarke took over the TC. There is small amount of work to complete the document, and the TCC is working with high priority to finish the draft to a final form in next few months.

TC2-29 Measurement of Detector Linearity

Chair: T. Goodman (UK) **AD:** Sauter

ML: Andor (Hungary), Bastie (France), Bittar (New Zealand), Budde (Canada), Distl (Germany), Dezsi (Hungary), Mihailov (Russia), Mostl (Germany), Ohno, Parr (USA)

TR: Prepare a CIE guide on methods for the characterization of the linearity of detectors of optical radiation, including different principles by which the linearity of detectors can be determined and causes of non-linear behavior, to aid users of optical radiation detectors in the selection and use suitable devices for specific applications.

ST: Report given by the TCC. As reported last year, the TCC is not able to continue this TC work due to her increased workload. Last time, Jean Bastie was suggested as a new TC chair but he is unable to take over. The TC has a fairly advanced draft. The TCC is looking for someone willing to take over the chairmanship.

<Discussion>

DD Goodman asked for any volunteers from the attendees, but no response. Goodman asked if this TC should be continued or closed. None of those present favoured closure at this stage. Goodman will continue to look for a new chairperson and is open for any suggestions for candidates.

TC2-30 Array Radiometry

Chair: Jim Palmer (USA) **AD:** Johnson

ML: Abasari (Hungary), Andoh (Japan), Goodman (UK), Jones (USA), Mihailov (Russia), Pfleger (Austria), Sauter (Germany), Wychorski (USA)

TR: Prepare an annotated bibliography for the CIE journal on diode array radiometry. Make appropriate recommendations for future work in diode array radiometry.

ST: Report given by the AD Johnson. No report received from the TCC. No activity reported since Palmer took over from Wychorski in 1998. Some of the contents of the bibliography are getting outdated and need to be reviewed again. A suggestion was made to move this work to TC2-51 (by R Austin) and possibly incorporate this into the 2-51 document if appropriate. AD Johnson is to contact R. Austin to request that he study this option more closely and make a recommendation on whether it is feasible / desirable.

TC2-32 Measuring Retroreflectance of Wet Horizontal Road Markings

Chair: N. Hodson (USA) **AD:** Johnson

ML: Austin (USA), Davies (USA), Dibbern (Germany), Hubert (France), Johnson (USA), Lundkvistl (Sweden), Meydan (Australia), Meseberg (Germany), Rennilson (USA), Schmidt-Clausen (Germany), Schnell (USA), Schreuder (Netherlands), Soardo (Italy), Sorenson (Denmark) – revised August, 1999

TR: To prepare a guide for the methods of measuring coefficient of retroreflected luminance (specific luminance) of horizontal road markings under wet weather conditions.

ST: AD Johnson reported. The TC met last fall in Toronto in conjunction with D4 meeting. There is a draft document in progress. The TC is working in close contact with D4 in lighting for transportation and traffic. The TC plans to meet in Budapest

with D4.

TC2-35 CIE Standard for V(λ) and V'(λ)

Chair: K. Mielenz (USA) **AD:** Johnson

ML: Bastie (France), Gardner (Australia), Hengstberger (South Africa), Moore (UK), Ohno (USA), Parr (USA), Robertson (Canada), Sauter (Germany), Schanda (Hungary)

TR: To prepare a new CIE Standard on the present V(λ) and V'(λ) functions.

ST: AD Johnson reported. As reported in Editor's report, there were some comments made in the Division and BA ballot. The TCC and the Editor worked to resolve these comments, and made a final edited version, which is to be sent for NC ballot shortly.

TC2-36 Retroreflection: Definition and Measurement (Revision of CIE Publication 54, Liaison with CEN/226) **AD:** Johnson

Chair: J. Rennilson (USA)

ML: Arens (USA), Couzin (USA), Dibbern (Germany), Heenan (USA), Hubert (France), Johnson (USA), Kramp (Germany), Nanjo (Japan), Price (UK), Schmidt-Clausen (Germany), Sorensen (Denmark), Terstiege (Germany), Werner (Sweden) – revised, August 1999.

TR: To revise and update publication 54. To standardize test methods and measurement geometry for measuring the photometric and colorimetric properties of all types of retroreflectors under both day and nighttime conditions. To prepare this CIE document in ISO format to be issued as a joint CIE/ISO standard.

ST: Report given by the TCC. He received from CIE CB a copy of the final print of the 62-page document except color figures, with a few editorial comments. The rationale for the color figures, for the first time in a CIE document, is due to the complexity of visualizing the three dimensional systems and geometries for measurements of retroreflection. The document is to be published shortly. A recommendation was made to start a new TC to produce an ISO/CIE standard from the new document (CIE 54.2). The TCC thanked Editor Moore for his tremendous work for editing.

TC2-37 Photometry Using Detectors as Transfer Standards

Chair: Y. Ohno (USA) **AD:** Sauter

ML: G. Andor (Hungary), R. Austin (USA), J. Bastie (France), A. Bittar (New Zealand), G. Czibula (Germany), A. Corrons (Spain), G. Dezsi (Hungary), G. Eppeldauer (USA), J. Gardner (Australia), T. Goodman (U.K.), R. Köhler (BIPM), J. Moore (UK), K. Muray (USA), J. Pietrzykowski (Poland), R. Rattunde (Germany), M. L. Rastello (Italy), G. Sauter (Germany), J. Schanda (Hungary), P. Wychorski (USA)

TR: To prepare a report on the properties of $V(l)$-corrected detectors that are suitable for disseminating and maintaining photometric units. This report will include methods for the use of these detectors.

ST: Report given by the TCC. He rewrote many sections of the draft with the latest information available, and produced the 6th draft, which was distributed to the members in April 2001 and comments being requested by June 15. The draft is also

on the website. Some changes were made on terminology to resolve comments made before, and more detailed information added to the determination of reference plane in the Annex. The next draft is hopefully to be sent for TC ballot later this year.

TC2-39 Geometric Tolerances for Colorimetry

Chair: D. Rich (USA) **AD:** Johnson

ML: Baba (Japan), Bittar (New Zealand), Decarreau (France), Erb (Germany), Fisch (USA), Early (USA), Hanssen (USA), Johnson (USA), Kravetz (USA), Ladson (USA), Jordon (Canada), Witt (Germany), Pietrzykowski (Poland), Taylor (UK), Zwinkels (Canada)

TR: Compile a technical report and recommendations specifying the geometric tolerances for the various geometries in colorimetry, including 0/45, 0/d and others. Parts of this technical report may be suitable for inclusion in a CIE standard specifying several geometric tolerance levels.

ST: The TC met for the seventh time on May 14 at NIST, prior to this D2 meeting, jointly with CORM OP-2 committee on Geometry. Five committee members and 21 guests were present. A third draft had been distributed to the committee members by email and its revisions were discussed. Some progress was made in coming to consensus about certain portions of the document. A most important decision was made to restructure the document to better emphasize the "definition" of the recommended geometry then place the committee's experimental data and literature citations afterwards, indicating why there must be tolerances around the defined geometries. The report will then conclude with a section describing tolerances or allowed variations on the recommended geometries. Improved figures and plots are still needed to make the document more understandable. Several visitors to the committee have volunteered to provide some input to the committee concerning ways to test or validate the specifications of the recommended geometries. The TCC is planning on having a fourth draft of the document with the revised structure and new information out for committee review by fall of 2001. If all promised inputs are returned to the committee chair in a timely fashion then the fifth draft will be the final draft of this report and recommendation.

<Discussion>

Schanda mentioned that CIE 15.3 (revision of colorimetry document 15.2) should be concurrent with the documents from TC2-25 and TC2-39. He requested for active liaison of these TCs with TC1-48 (D. Rich is already a member). TC1-48 will meet in Rochester in June this year. AD Johnson added that, after publication of a document from TC2-39, a new work should start to produce a CIE standard on this subject. Schanda added that, related to this, D1 agreed to produce a CIE standard on colorimetry (a new TC with Alan Robertson), and D2 and D1 should work closely in these areas.

TC2-40 Characterizing the Performance of Illuminance and Luminance Meters

Chair: R. Rattunde (Germany) **AD:** Sauter

ML: Austin (USA), Bastie (France), Czibula (Germany), Dezsi (Hungary), Goodman (UK), Khandelwal (India), Khanh (Germany), Mahidharia (India), Moore (UK),

Ohno (USA), Pietrzykowski (Poland), Saito (Japan), Sauter (Germany), Stolyarevskaya (Russia), Xu (Singapore), Ye (China) – revised July 1999

TR: Convert the present CIE Technical Report No. 69 into an ISO/IEC standard. Prepare a combined CIE/ISO standard describing the definitions of quantities influencing the performance of illuminance and luminance meters, as well as defining measurement procedures for the individual error quantities.

ST: Report given by the TCC. There has not been much progress since Warsaw meeting due to recent workload of the TCC. He is working on the next draft version and plans to use e-mail reflector to discuss the next draft on-line before next physical meeting.

TC2-42 Colorimetric Measurements for Visual Displays

Chair: C. Wall (UK) **AD:** Johnson

ML: G Andor (Hungary), S Ansell (USA), R Baribeau (Canada), R Berns (USA), P Boyton (USA), CDalton (UK), A Hanson (UK), J Hardis (USA), H Ikeda (Japan), H Lara (USA), J Laur (Germany), C Leone (USA), M Lindfors (Finland), R Luo (UK), L MacDonald (UK), J Maelfeyt (Belgium), S McFadden (Canada), Y Ohno (USA), ML Rastello (Italy), M Reid (UK), T Sakai (Japan), J Schanda (Hungary), A Stienstra (Netherlands), M Stokes (USA), F Vienot (France) – revised June 2001

TR: To produce a Technical Report summarizing recommended practice for the measurement of the colorimetric and spectroradiometric properties of visual displays.

ST: The TCC had to leave early but sent a written report as follows. The TC met on May 17 at NIST prior to the D2 meeting. The meeting was attended by 6 members and around 30 guests. The 2nd draft (distributed in April 2001) was discussed including comments from Baribeau, Hanson, Laur and Macfadden sent by email. Several major revisions to the document were discussed including a complete review of chapters 4 and 5 to reduce duplication. The TCC asked for volunteers to further review the sections of the document. The committee had planned to produce the next draft in a few months, with final version of the document due by the end of the year, however the scale of revisions means that this tight time scale will be extended. The TCC will circulate an amended schedule, and revise the document to include comments from this meeting. Following that the chapters will be circulated to volunteers, before the 3rd draft is launched for general comment.

<Discussion>

Vandermeersch suggested that the TC should consult Editor Moore at early stages as a number of parts in the document need to be clarified. Goodman already asked the TCC to send the draft to Moore.

TC2-43 Determination of measurement uncertainties in photometry.

Chair: G. Sauter (Germany) **AD:** Sauter

ML: Bastie (France), Corrons (Spain), Goodman (UK), Köhler (BIPM), Moore (UK), Ohno (USA)

TR: To prepare a CIE recommendation as basis for the determination of measurement uncertainties valid for selected quantities used in photometry.

ST: Report given by the TCC. The TC met on May 18 at NIST prior to this Division

meeting. The document has two main parts. The first part on the fundamentals of uncertainty evaluation is now complete except editing. The second part is for examples. The TCC hopes to add more examples in the second part, and is requesting more inputs on practical applications. The document is planned for completion in one year for TC ballot.

<Discussion>

Vandermeersch commented that, the document only covers examples of calibrations in photometry, and suggests that this document be published as "uncertainty evaluation in *fundamental* photometry" and in future to produce another document to cover many more practical examples of application measurements including testing measurements. Andersen agreed that we need coordination with other Divisions so that those people who are involved in field measurements or production measurements can have opportunities to send such examples for the document and to cover all aspects of measurements. Goodman urged those who need help to send application examples to the TCC. Vandermeersch added that there is a need for guidance on how to determine tolerances in production measurements of lamps and luminaries. Bastie mentioned that ISO 17025 now requires uncertainty statements for testing as well as calibrations. Sauter responded that he understands such needs but tolerance (e.g., alignment of test lamps) is a different issue from uncertainty of measurement and he did not plan to elaborate on it. But as we had many comments on this, he will try to get more inputs on this issue and consider some solutions. Application examples and comments on related issues should be sent to TCC as a matter of urgency if they are to be considered for inclusion.

TC2-44 Vocabulary Matters

Chair: J. Moore (UK) **AD:** N. Johnson

ML: Billmeyer (USA), Burghout (Netherlands), Ionescu (Romania), Johnson (USA), Köhler (BIPM), Morren (Belgium), Nishi (Japan), Ohno (USA), Poppe (Hungary), Sauter (Germany), Schanda (Hungary), Woo (Canada)

TR: To provide liaison between Div.2 and TC 7-06 "Lighting Terminology" and support the preparation of the new edition of the Lighting Vocabulary in the field of light and colour measurements.

ST: No report received from the TCC.

<Discussion>

Goodman requested all the TC chairpersons to send new terms from their TC documents to J. Moore immediately, as the next ILV version is now being finalized. Schanda noted that CIE CB is compiling the next version but this has been delayed due to slow responses from some Divisions, including D2. Kohmoto raised a concern that CIE Vocabulary committee is not an authorized one, and need revision of Code of Procedures for defined schedules as done by IEC. Rennilson commented that clarification of responsibility and some better mechanisms are needed. A great difficulty in communication with Moore, due to the fact that he has no email, was mentioned. A suggestion was made to create an email reflector so that TCCs can send new terms (proposed for inclusion in next ILV version) by email and stored in one place for review by anyone. Secretary Ohno agreed to establish these

functions. DD Goodman volunteered to act as a contact point for email communications to Moore.

TC2-45 Measurement of LEDs - Revision of CIE 127

Chair: Kathleen Muray (USA) **AD:** Sauter

ML: Austin (USA), Bando (Japan), Balta (USA), Berkhout (USA), Bouman (Netherlands), Budzinski (South Africa), Bym (USA), Carr (USA), Distl (Germany), Ellis (USA), Fleischer (USA), Gan (Singapore), Halkin (Belgium), Heidel (Germany), Jones (USA), Kohmoto (Japan), Larsen (Denmark), Marchl (Germany), Moore (UK), Myers (USA), Ohno (USA), Rastello (Italy), Sauter (Germany), Scarangello (USA), Schanda (Hungary), Solomon (Taiwan), Stolyarevskaya (Russia), Webb (USA), Young (USA) – revised Jul.00.

TR: Revise CIE Pub. 127 to include improved definitions of quantities and methods of measurement for total flux and partial flux of LEDs and to re-evaluate other parts including spectral and color measurements of LEDs.

ST: Report given by the TCC. The TC met on May 14 at NIST, prior to this Division meeting, with over 40 attendees including many guests. The 3rd draft (sent out on May 4) was distributed and discussed. The discussion focused on total flux measurement geometry. The TC agreed to adopt "partial flux" with a given opening angle, in addition to the 4π total flux, and not to adopt hemispherical forward flux. There are still issues to be resolved on conditions of spectral power distribution measurement (bandwidth, intervals, geometry) and evaluation of the spectral mismatch of photometers (to replace f_1'). Virtual meetings were suggested to continue discussions on such issues before next physical meeting.

TC2-46 CIE/ISO standards on LED intensity measurements

Chair: John Scarangello (USA) **AD:** Sauter

ML: Angerstein (Germany), Bando (Japan), Bouman (Netherlands), Bym (USA), Carr (USA), Distl (Germany), Ellis (USA), Goodman (UK), Heidel (Germany), Hwang (Taiwan), Jones (USA), Lester (USA), Moore (UK), Ohno (USA), Rastello (Italy), Sauter (Germany), Scarangello (USA), Schanda (Austria), Schumacher (Germany), Sojourner (USA).

TR: To prepare a CIE/ISO standard on the measurement of LED intensity measurements based on the CIE Pub. 127.

ST: Report given by the TCC. The TC met on May 17 at NIST prior to this Division meeting. Draft 4 was distributed and discussed. The TC first discussed tolerances on geometric specifications, and agreed to put them in the Annex. For methods of calibration, the TC agreed to include the substitution method and the detector-based method, and to remove the method based on flux-based calibration. Some other changes have been agreed on LED test conditions (temperature) and LED alignment (mechanical axis). The section for uncertainty calculations to be completed. The TCC plans to go through a few more drafts to complete the work by San Diego meeting.

TC2-47 Characterization and Calibration Methods of UV Radiometers

Chair: Gan Xu (Singapore) **AD:** Sauter

ML: Hengstberger (South Africa), Wilkinson (Australia), Lambe (UK), Rattunde (Germany), Saunders (USA), Pietrzykowski (Poland), Corrons (Spain), Larason (USA), Thompson (USA), Kohmoto (Japan), McArthur (Canada), Kravetz (USA)

TR: Prepare a CIE recommendation on methods of characterization and calibration of broad-band UV radiometers in the spectral ranges of UVA and UVB for industrial applications.

ST: As the TCC left earlier, a written report from the TCC was read. The TC met at NIST on May 17 for 4 hours. The meeting was attended by 30 participants (9 members, 3 new members, and 18 guests). The 1st draft (distributed on March 1, 2001) was discussed. The TC agreed on the overall structure of the document. A number of decisions were made to further improve the draft. Future work needed was also discussed. The 2nd draft was targeted for Oct. 2001. Next TC meeting schedule depends on the next D2 meeting schedule. The TCC will send an e-mail to all members to confirm their continued interest in the TC work and ask for more active contribution to the preparation of the document.

TC2-48 Spectral responsivity measurement of detectors, radiometers, and photometers

Chair: G. Eppeldauer (USA) **AD:** Sauter

ML: Austin (USA), Boivin (Canada), Bouman (USA), Corrons (Spain), Coutin (France), Dezsi (Hungary), Gardner (Australia), Goodman (UK), Köhler (BIPM), Larason (USA), Larsen (Denmark), McArthur (Canada), Ohkubo (Japan), Palmer (USA), Pietrzykowski (Poland), Rattunde (Germany), Sauter (Germany), Webb (USA), Xu (Singapore), Schanda (Hungary)– revised June 01.

TR: To rewrite the technical report CIE 64 (1984) "Determination of the spectral responsivity of optical radiation detectors" to update device and measurement technology, and include the spectral irradiance and radiance responsivity measurement for radiometers and photometers from UV to near IR.

ST: Report given by the TCC. The TC was formed in 1998. The TC met in Warsaw and in Teddington. The TC met for the third time on May 17 at NIST prior to this Division meeting, with about 40 attendees including many guests. The second draft was distributed and discussed. The TC agreed to change the scope by extending the wavelength range from 200 nm to 2.5 μm. The TC also agreed that the report will remain comprehensive to include measurements of 1) spectral power responsivity, 2) spectral irradiance responsivity, and 3) spectral radiance responsivity, and describe measurement geometry, setup, measurement methods, and uncertainties for each mode of measurement. Properties of detectors will also be described to give guidance in the selection of standard detectors. Matrix type detectors (focal plane arrays, etc.) will also be included. Still a lot of work to be done, and the TCC expects to finish the document in next three years.

<Discussion>

There was a question whether “matrix type detectors” include diode array-spectrometers. The TCC implied that some measurements may apply to spectroradiometers. Then a concern was raised on possible overlaps between this TC and TC2-51. DD Goodman clarified that, according to the TR of the TC, the TC should deal only with single element detector/radiometer/photometers and not spectroradiometers.

TC2-49 Photometry of Flashing Light

Chair: Y. Ohno (USA) **AD:** Vandermeersch

ML: Andersen (USA), Arens (USA), Austin (USA), Berkhout (USA), Couzin (USA), Ellis (USA), Eppeldauer (USA), Goodman (UK), Hengstberger (South Africa), King (USA), Köhler (BIPM), Kondo (Japan), Rattunde (Germany), Rennilson (USA), Sagawa (Japan), Schmidt-Clausen (Germany), Sauter (Germany), Tutt (UK), Webb (USA)

TR: Produce a technical report for photometric measurements of flashing light, including derivation of the photometric quantities applied to flashing light, measurement of light sources, and calibration of photometers for flashing light.

ST: Report given by the TCC. The TC met at NIST on May 17 prior to this Division meeting, with about 30 attendees including 10 TC members. The draft 1.0 (distributed to members on May 6) was discussed. This draft was totally rewritten from the previous version (partial draft 0.2), with two additional sections filled. Much time was spent for discussions on the definitions of quantity terms for flashing light. The TC agreed on some changes on the terms and combining two sections. D. Couzin raised the concern again on the Form Factor method, which may produce erroneous results for a narrow pulse superimposed on a slower pulse. The TCC emphasized that, in spite of such possible problems, there are no better methods that are well recognized and widely accepted now, than the Form Factor Method. However, the TC is open for further studies on such problems, and the TCC suggests such analyses to be made on real waveforms of flashing lights actually used in various applications rather than on hypothetical data. The members are requested to collect such data and send to the TCC.

TC2-50 Measurement of the optical properties of LED clusters and arrays

Chair: G. Sauter (Germany) **AD:** Vandermeersch

ML: C. Jones (USA), J. Scarangello (USA), Xu Gan (Singapore), J. Arens (USA), T. Goodman (UK), D. Halkin (Belgium)

TR: To produce a technical report for the measurement of optical properties of visible LED arrays and clusters, to derive optical quantities for large LED arrays and recommendations for measurement methods and conditions.

ST: The report given by the TCC. An informal discussion was held for about an hour right after the LED Symposium on May 12, with about 15 attendees. There were active discussions on definitions of LED cluster and necessary work to be done. Many new members were found, and further discussion will continue to form the plans for the document.

TC2-51 Calibration of diode-array spectrometers

Chair: Richard Austin (USA) **AD:** Johnson

ML: T. Goodman (UK), G. Hopkinson (UK), S. Prince (UK), Pietrzykowski (Poland), R. Smith (USA), R. Bergman (USA)

TR: To produce a technical report which sets out guidelines for the recommended procedures, methods and transfer standards for the calibration of diode array spectrometers.

ST: AD Johnson and DD Goodman reported as the TCC had to leave early. The TC met on May 14 at NIST, prior to this D2 meeting, in conjunction with CORM CR-6 subcommittee. The meeting was attended by about 40 participants including many guests. A suggestion was made to include CCD array spectroradiometers, and the TC agreed to change the title to be "Calibration of multi-channel spectrometers", and TR also to be changed accordingly. A proposed table of contents of the report was distributed and discussed. Some new items were added after discussion.

<Discussion>

D2 members voted, with no objection, to change the title and TR of this TC as proposed. Goodman introduced a document from NPL on this subject, "Guide to the Calibration and Use of Detector-array Equipment".

TC2-52 Addendum to CIE 121 for the Photometry of Emergency Lighting Luminaires

Chair: G. Vandermeersch (Belgium) **AD:** Vandermeersch

ML: L. Bedocs (UK), TA. Boeman (Netherlands), A. Ottoson (Sweden) – more members are searched.

TR: To produce an addendum to CIE publication 121 containing specific requirements for the photometry of emergency lighting luminaires, in particular to provide additional correction factors on the relative output of the luminaires at specified times of operation.

ST: Report given by the TCC. The TC work relies on the work done in other Divisions and other international organizations (IEC and CEN where major work has been done or is in last stages). These organizations deal with what to measure, while this TC will define how to measure emergency luminaires. Within CIE D5, TC5-19 met twice, in October 2000 and April 2001. Their work is still in a very early stage but one clear statement "5.19 will not contradict the work done in IEC34 and CEN169 TC3" permits us to start relaying on the specific photometric requirements we have in IEC standard 592-2-22. These requirements were implemented by IEC as IEC34 considers the photometric performances as part of the safety requirements for this type of luminaire. In parallel we have in CEN169 a work started on presentation of photometric data. Even if this work is going on in Europe only, IEC has the intention to endorse it. As a consequence the non-European members of IEC34 now receive all information of the work done in European circles. Therefore our TC will also include CEN drafts in our work. All experts in the photometry of emergency luminaires willing participate may contact the chairman. A one and half day meeting is planned in Europe (Berlin or Brussels) for 9th and 10th of October following the TC2-23 meeting on 8th and 9th.

7.2 Reporterships

Progress reports on the reporterships were given by the ADs and the reporters who were present.

R2-05 Visual Gloss (J. Taylor, UK) **AD:** Johnson

ST: Goodman reported. Taylor moved out of this technical area, and Mike Pointer has taken over her position at NPL. Goodman will ask if Pointer is willing to take over this reportership. D. Rich added that ISO TC130 is standardizing a new approach

on gloss measurement by capturing diffuse reflectance and specular reflectance simultaneously. Goodman asked for written information on this from Rich to pass it on to Pointer.

R2-06 Standardization of Measuring Geometry for the Colorimetry of Metallic Coatings (C. McCamy, USA) **AD:** Johnson

ST: Johnson reported. No new reports received. At last D2 meeting, McCamy sent a written proposal for a new TC on this subject but the action has not been complete.

There was another proposal for a new TC on the same subject as reported in section 9 addressing the exactly the same subject as this reportership. The new TC was approved. AD Johnson to contact McCamy to close this reportership.

R2-18 OIML Matters (G. Sauter, Germany) **AD:** Sauter

ST: Sauter reported. There are no on-going activities that need actions by CIE. Bastie mentioned that there is a proposal to work on illuminance meters and luminance meters, but no activity yet. The reporter suggests to keep this reportership open. A suggestion was made to move this reportership to liaison, and D2 agreed on the change.

R2-21 Use of detectors as absolute transfer standards for spectroradiometry (N. Fox, UK) **AD:** Sauter

ST: Goodman reported. There is nothing new to report this time. This reportership is kept open for another year to see if any action needed by Div.2.

R2-23 ISO/CIE Standards for the measurement of reflectance and Transmittance (D. Rich) **AD:** Johnson

ST: Rich reported. A literature search was performed going back 18 months for the terms reflectance and transmittance measurements. It resulted in more than 2000 hits. Of those papers, VIS-NIR diffuse reflectance used either alone or in conjunction with transmittance measurements stands out as the dominant measurement described in those papers. The applications are in, for example, agriculture, for inspection of fruits and vegetables using non-invasive spectroscopy; pharmaceuticals, where the two measurements are combined in a quantitative analysis of whole tablets; and in non-invasive analysis of human tissue, primarily scanning for subcutaneous indications of malignant tissues. Rich has included a few examples of papers that he considers indicative of the progress being made in the application of reflectance and transmittance measurements. It is estimated that improved certified reference standards, calibration and verification artifacts and transfer standards with lower uncertainties will soon be needed in these medical and biochemical applications of spectroscopy. Rich knows of no new standards on reflectance and transmittance within CIE. ISO has made some progress in its revision of the ISO 5 series on reflection and transmission densitometry. The revision has the goal to separate the definition of the spectral or geometric properties from the implementation and tolerances. All sections have been through at least two committee drafts and one has been moved to DIS status.

<Discussion>

Schanda commented that CIE is supposed to be the leading organization to produce standards in this area of reflectance and transmittance measurements. If ISO works on these subjects, they should get input from CIE and possibly to have double logo standards. We have mechanism from CIE to ISO: why not in the other direction? Hsia pointed out that this reportership was established to investigate the need for converting the CIE technical report on reflectance and transmittance measurement (CIE 130), and the reporter is not addressing this. Hsia's point was confirmed in the Warsaw meeting minutes. AD Johnson requested Rich to come back to this direction to make a decision on the original proposal. Regarding the issues on collaboration and interaction with ISO, Johnson suggested that it should be handled separately as a liaison function, and that the policy between CIE and ISO should be reaffirmed at higher level. DD Goodman is to contact CIE CB on this ISO issue.

R2-24 Classification of Color Measurement Instruments (Reporter: Ohno)

AD: Johnson

ST: Ohno reported. This reportership was established by request from Div.8 in 1999. The users of color measuring instruments (colorimeters and spectrophotometers) in imaging applications need guidance on how to select such instruments. Manufacturers' specifications do not give useful information for users. The reporter has an idea on how to approach a solution but no progress was made in the past year. The reporter will try some analysis by next meeting.

R2-25 Liaison with IALA (Reporter: Ian Tutt) **AD:** Vandermeersch

ST: Report given by Andersen, who served on the IALA (International Association of Lighthouse Authorities) working group on photometry. IALA is revising "Standard for Photometry of Marine Aids-To-Navigation Signal Lights (1977)". The revised document was planned for a standard, but at a recent IALA meeting it was decided that the document should be a recommendation rather than a standard because the document covers a very wide range of measurement conditions. Andersen will contact IALA to ask whether they still have an intention of submitting the document for adoption as a CIE recommendation/standard. This reportership will be kept for another year.

May 19

7.3 Liaisons with other organizations

CCPR (Köhler)

No report received from Köhler. Zwinkels, who attended the last CCPR meeting, gave the following information. The CCPR met in last April in Paris. It discussed status of various Key Comparisons and CMCs (Calibration and Measurement Capabilities). K1a Spectral irradiance comparison, pilot NPL, is in progress, as is K6 Comparison of spectral regular transmittance, pilot by BNM-INM. K5 Spectral diffuse reflectance factor comparison, pilot by NIST, is delayed due to selection of material as transfer standard. Aging effect of spectralon due to UV exposure was

reported. BCRA matt ceramic tiles and spectralon are to be used in the comparison. There were a lot of discussions on CMCs for Appendix C of the MRA database. Data from EUROMET and APMP are now on the BIPM website. Next meeting of JCRB (Joint Committee of the Regional Metrology Organizations and the BIPM) will be in March next year.

IEC TC34A on Lamps, TC34D on Luminaires (Vandermeersch)

Vandermeersch reported. There were three meetings since Teddington, in Helsinki, San Diego, and in Düsseldorf. TC34's work is to standardize new type of lamps, electromagnetic or electronic gears and provide safety specifications for them and their incorporation in luminaires. In electronic gears main activity now is communication and controlling system for dimming. In 34A, a controversial issue on the measurements of 16 mm tubular fluorescent lamps, which was conflicting with some national standards, has been resolved: flux measurements on naked lamps of these thermally-sensitive lamps will be made at 25°C like all other lamps and no longer at 35°C, even if the performance is optimal at 35°C. Flux at 25°C must be given but the manufacturer may provide a factor for 35°C performance. The benefit of flux increase in fact is in this way given to the luminaire (e.g. increase of Light output ratio), which is responsible for the increase of temperature of the lamp. There are no changes to reference ballast impedance. EL panel emergency panel in TC34, IEC deals with safety of luminaries, so they plan to continue to fix photometric data for such luminaries.

<Discussion>

Schanda asked about the status of the two Japanese proposals on specifications and photometry of white LEDs. Vandermeersch reported that the two proposals have been accepted by TC34 but no work has started yet. He believes the work for photometry document should be transferred to CIE. This new work should be watched closely.

IEC TC100/TA2 -Colour Measurement and Management in Multimedia System (Y. Ohno)

Ohno reported. Many documents have been published from this committee, including Part 2-1: Colour management - Default RGB colour space - sRGB (1999), Part 3: Equipment using cathode ray tubes (2000), Part 4: Equipment using liquid crystal display panels (2000), Part 5: Equipment using plasma display panels (2000), Part 8: Multimedia colour scanners (2001), Part 9: Digitalcameras (2000). Many more documents are being developed or to be started, including Part 1: General (not started yet), Part 2-2: Colour management - Extended RGB colour space - scRGB (CD), Part 2-3: Colour management - Default YCC colour space - sYCC, Part 6. Equipment used for digital image projection (NP), Part 7-1: Colour printers -Reflective prints - RGB inputs (FDIS), Part 7-2. Colour printers - reflective prints - CMYK inputs (1CD), Part 7-3. Colour printers - transparent prints (1CD). Ohno reviewed and contributed a lot to Parts 3, 4, and 9 in 1999. Many problems concerning metrology in early drafts of these documents were corrected. But now there are so many documents coming out in a very fast pace, he is unable to review all of these. As many of these documents concern measurements, it is

important that all these documents be reviewed thoroughly by experts in Division 2. Ohno asked for help from other Div.2 experts in this subject area. Their next TA2 meeting will be in Florence, Italy in October 2001.

<Discussion>

Rich offered help to review some of their documents. Schanda raised a concern that this IEC committee is working very fast and we often have no chance to review the documents. He suggested forming a group of experts in this area to collaborate to review all the documents in more systematic manner. A new technical committee is suggested.

ISO/IEC JTAG2 – ISO/IEC Joint Technical Advisory Group 2 (Y. Ohno)

Ohno reported that JTAG2 was dissolved last year because IEC withdrew from this group. ISO is maintaining a similar function as a steering committee on color imaging applications within ISO (manly TC130 and TC42). As JTAG2 was dissolved, Ohno suggested to close this liaison function, and the attendees agreed.

ISO TC6/WG3 Paper, board & pulps (J. Zwinkels)

Zwinkels reported. She attended the last meeting of this TC in September in British Columbia. The ISO standard for 20 degree gloss has been sent to CIE CB for review. At this meeting, there were proposals to draft several new ISO standards, for transparency, for colorimetric calculations for materials, and for so called D65 brightness. The last proposal was contentious because there is already an ISO standard on brightness which is based on CIE Illuminant C. Paper industry finds "indoor day light illuminant" based on filtered tungsten lamp is more suitable and have better correlation with paper brightness than D65 or Illuminant C. Such indoor day light illuminant is being considered for standardization. This also has to be brought into attention of D1.

ISO TC 180/SC 1: Solar energy/Climate - Measurement and data (Dieter Kockott)

No report has been received. DD Goodman is to contact D. Kockott in September.

Division 8 (Ohno)

There were changes in the officers. As Michael Stokes withdrew from CIE activities, Noboru Ohta is now Associate Director, and David McDowell is the Secretary of the Division. Div.8 has 6 TCs, the same as last year, mostly related to Div.1. TC8-06 is on Image Technology Vocabulary, chaired by J. Schanda, where efforts are in progress to collect terms in imaging applications for ILV. Div.8 added some new reporterships. The current list is:

- R8-01 Grading of instruments- Y Ohno (USA)
- R8-02 Fluorescence - C McCamy (USA)
- R8-03 Reportership on potential CIE and IEC/TA2 - H Ikeda (Japan)
- R8-04 Effects of Fluorescence in characterization of Imaging Media - D. Rich (USA)

R8-01 is the same one as R2-24 in Div.2, and Ohno is to make some plans to coordinate these. The next Div. 8 meeting will be held in November 2001 in Scottsdale, Arizona, in conjunction with Color Imaging Conference.

<Discussion>

As the Div. 8 activities are now becoming stabilized, Ohno suggested to close this liaison function and to maintain it in an informal way as we do with other CIE Divisions. AD Johnson, however, suggested that we need a good liaison mechanism like this on D8 and D1 also, and suggested to keep this liaison as it is. Ohno asked for a new volunteer due to his increasing workload. Alan Kravetz (USA) agreed to take over this liaison function. Ellen Carter added that there's the D8 activity report on their website for more information.

8. Dissolution of TCs and other functions

D2 members voted to close the following functions, with no negative votes.

(1) TC2-36 (Retroreflection: Definition and Measurement / Rennilson) when the published document has appeared.
(2) TC2-35 (CIE Standard for V(λ) and V'(λ) / Mielenz) when the published document has appeared.
(3) R2-18 (OIML Matters / Sauter), and move it to a liaison function.
(4) The liaison for JTAG2 (Ohno), as the group was dissolved.
(5) The liaison for IEC TC100/TA2 (Ohno), as a new TC is to be created for this function (See next section).

* R2-06 may also be closed after confirming with the reporter McCamy.

9. Proposal for NEW TCs and other functions

9.1 New Technical Committees

(1) Multi-Geometry Color Measurements of Effect Materials

Chair: Rössler (Germany) **AD:** Johnson

TR: Write recommendations for the color measurement of effect materials.

<Proposal>

Proposed by Sauter, with original title: "multi-geometry color measurements of effect paints in the automotive industry and color tolerances". The standard measurement geometries d/0 and 45/0 are not sufficient to characterize the appearance of effect paints like metallic paints. Therefore multi-geometry color measurements are necessary, and also acceptable tolerances for past/fail decisions are important. A DIN standard on this subject is already published and widely accepted. An international standardization in this area is getting very important. A technical report is to be developed based on the DIN standard.

<Discussion>

Goodman and Johnson noted that this is the same proposal as the one made by McCamy last year (R2-06). Johnson suggested changing the title to be more general (effect materials). Rich warned that it might make a big difference in what to be covered. Schanda mentioned that liaison with CEN, ISO and other groups will be important. Witt mentioned that Rössler is active in ASTM and CEN and will make a good liaison with these groups.

<Decision>

Division members voted with no objection to establish this TC (with the title and TR broadened from the original proposal, as given above). AD Johnson to contact McCamy to inform him of the new TC.

(2) Review of IEC documents for color measurement and management in multimedia systems

Chair: J. Schanda (Hungary) **AD:** Johnson

TR: To review the draft documents prepared by IEC TC100/TA2 on behalf of Div. 2.

<Proposal>

Based on the discussion at the liaison report of IEC TC100/TA2(see7.5), DD Goodman proposed to form a TC for this function. Since Ohno has too many responsibilities including two TCs, Schanda agreed to be the TC chair. Ohno, Rich and others to collaborate with Schanda.

<Decision>

Division members voted, with no objection, to establish this TC.

9.2 New Reporterships

(1) Eye Safety of Light Emitting Diodes

Reporter: T. Goodman (UK) **AD:** Sauter

TR: To liaise with D6 over the need for CIE recommendations on methods for measurement of assessment of the eye safety of LEDs.

<Proposal>

Proposed by G. Sauter for a new TC, with proposed chairman as Werner Horak (Germany), and with proposed TR: "To examine the potential ocular hazards of LEDs by comparing emissions of current devices with ocular exposure limits and to compare methods of hazard measurements. The issue was raised by the Horak's presentation at the LED Symposium. The TC is to produce a technical report."

<Discussion>

Scarangello mentioned that IEC76 develops laser safety standards including LEDs. Löfberg commented that there are already some TCs in Div. 6 dealing with similar subjects. Schanda added that the issue should be separated between biological hazard (D6 issue) and measurement of such radiation (D2 issue). Sauter suggested a D2 TC with collaboration with D6 as there are many measurement issues to be clarified first. Scarangello mentioned that in IEC document it is clear what to measure but is not clear how to measure. Johnson suggested that any overlaps with D6 or IEC should first be studied. After a long discussion, DD Goodman proposed to discuss with Dave Sliney first rather than to establish a TC now.

<Decision>

D2 members voted, with no objection, to establish a reportership on this subject and ask for input from D6. Goodman will serve as the reporter, and is to contact Sliney to discuss a possible new TC in D6 or D2, and how to collaborate between the two Divisions.

(2) Field Measurements for traffic signals

Reporter: C. Andersen (USA) **AD:** Vandermeersch

TR: To assess the need for a TC to produce recommendations on field measurements for traffic signals, in particular those using LED arrays.

<Discussion & decision>

As Andersen was not present, DD Goodman reported that this issue came out from the LED Symposium. Andersen raised a difficulty in field measurements of traffic signals to check their maintained luminous intensity levels. Various different methods were currently used with very large uncertainties. Appropriate methods, possibly including a method using a luminance meter, are to be investigated and some guidance needs to be made. Division members voted with no objection to establish this reportership.

(3) Evaluation of colorimeter spectral responsivity

Reporter: B. Kranicz (Hungary) **AD:** Sauter

TR: To review new methods for assessing the 'quality-of-fit' of the spectral responsivity of colorimeters, particularly for use with new sources such as LEDs.

<Discussion & decision>

This proposal came out from the TC2-16 meeting. The current TC document will be completed with basic evaluation terms based on CIE 69 to be published in a short time. A new work is proposed to investigate further evaluation methods of colorimeters for specific applications such as for LED measurement. B. Kránicz was suggested for the reporter and he agreed. Division members voted to establish this reportership with no objection.

9.3 New Liaisons

Div.2 agreed to establish the following new liaison functions.

(1) OIML (G. Sauter)
Moved from reportership R2-18.

(2) IDA (International Dark Sky Association) (J. Rennilson)
See next section 9.4 (3).

(3) ISO on reflectance and transmittance issues (D. Rich)
See report on R2-23. Rich agreed to take this liaison function, separate from R2-23.

9.4 Discussions on other proposals

(1) Measurement of LED dies and uncapsulated LEDs

Goodman raised this issue, which came out from the LED Symposium. Some participants suggested a need for guidance on measurement of LEDs at chip levels and wafer level, as they are sold in such forms and there is a need for some guidance in this area. Other LED shapes that are very different from the conventional LED lamps also need to be addressed. Schanda commented that measurement at production levels is outside the scope of CIE, and maybe the existing TCs can address such issues as additional information. The attendees came to a consensus that this issue is to be addressed in TC2-45, which is working on revision of CIE 127.

(2) CIE/ISO standards on retroreflectance measurements

This proposal was made last year from Rennilson to publish a CIE standard on retroreflectance, by taking the important contents from the TC2-36 report (Pub. 54.2). The decision was deferred last year since no chairperson and TR were prepared. We now have TR but not yet the chairperson. Christine Stratford in UK was suggested but not confirmed yet. DD is to approach C. Stratford.

(3) Definition of star magnitude

This was also proposed last year. The issue was not well understood, and consensus was made last year to get input from D4 and D5. Goodman raised the issue at CIE Board meeting, but the Board advised no needs for this work. Rennilson suggested that there may be some measurement needs in IDA (International Dark Sky Association) and he would contact them. Rastello is also to contact Soardo, the original proposer, for more information. It was suggested that issues related to this be watched as a liaison function with IDA. D2 agreed to form a new liaison, and Rennilson agreed to be the liaison person (see 9.3 above).

(4) Colour temperature and colour rendering for LEDs

Schanda raised issues relating to the fact that the current colour rendering system does not work well for LEDs and that the term colour temperature is often used for 'white light sources' such as white LEDs which lie well away from the Planckian locus. It was agreed that DD would raise these problems with D1 and request that they consider making new recommendations.

9.5 Changes in TCs and reporterships

(1) The title and TR of TC2-51 have been changed.
(2) The chairperson of TC2-42 has been changed to C. Wall (NPL, UK).
(3) The liaison person for Division 8 is changed from Ohno to Kravetz.

* TC2-29 is looking for a new chairperson.
* The reporter for R2-05 may change to Pointer.

The new lists of TCs, Reporterships, and Liaisons, are shown in **Attachment 3**.

10. General issues

(1) Draft documents on website

About 10 TC draft documents are now posted on the D2 website with password protection, and Secretary plans to post more documents. All documents can now be accessed with one password, but according to the tentative decision at the last D2 meeting, it was suggested that this should be changed to install separate passwords for each TC document. Several attendees expressed the view that having draft documents on the website is very useful and, in spite of the decision in Teddington, the current way using one password is appropriate and should be continued.

A concern was raised on copy right of documents. Someone who gets the password can send it to anyone else who may be non-members of NCs, and draft documents

might be proliferated in uncontrolled manner: there must be a way to prohibit unauthorized copies. Use of different passwords for each TC is more secure but was generally not supported by the attendees. A suggestion was made to put a statement at the top of each draft document. Further suggestion was to prepare a template for all TC drafts (with well-designed first page and use of header/footer). Secretary agreed to contact CIE CB and work with them to make such a template. Another opinion suggested that TC chairpersons should create TC websites and link them from the main D2 site. Secretary welcomed such attempts using their own servers (NIST server is difficult to access from outside).

A few suggestions were made on handling passwords: 1) give a clear instruction on handling the password to whoever receives it, 2) distribute the password only to the country members and TC chairpersons as well as D2 officers, and the TC chairpersons are to distribute it to TC members as necessary, 3) the password is to be changed every 6 months. Schanda noted that CIE CB has a plan to establish a central CIE server where a unique password is to be given to each member of CIE NCs to access some section of the webpages such as for TC draft documents. This can be a long-term solution, but a short-term solution is needed now.

DD Goodman took a general vote from all present, whether we change the decision made in London and now use single password for all documents but with the procedures 2)-3) described above. The attendees unanimously voted in favor of this proposal.

(2) Future Symposia and other D2 activities

DD Goodman mentioned that CIE is addressing new ways of bringing in new people, in particular, by symposia, and asked for ideas for future activities.

1) Schanda announced that he would like to invite next D2 meeting to University of Veszprém, Hungary (details in next section) in the fall of 2002, when we could possibly hold a D2 symposium in conjunction at Hungarian Academy of Science in Budapest, on subjects related to display measurements. There are issues to be addressed in measurements of reflective displays, projection displays, hardcopy, semi-hardcopy, OLEDs, electronic paper, etc. Rich suggested that it could combine subjects on reflectance and transmittance measurements related to CIE130. A one-day tutorial is also suggested.

2) At the LED Symposium in the previous week in Gaithersburg, the attendees hoped to have another symposium on this subject in two years. A consensus at this D2 meeting was that it should be in Europe in 2003 (separate from D2 meeting in San Diego), possibly at CIE Central Bureau.

3) There is also a need for another symposium on uncertainty evaluation. There is a plan for a workshop on this subject at CIE/USA-Canada meeting in Niagara Falls this November (15-17), so the CIE symposium should be one or two years apart from this. The plan will be discussed again at the next D2 meeting.

In summary, D2 agreed to have:
1) a symposium on display related subject in 2002 in Hungary,
2) 2nd symposium on LED measurement in 2003 at CIE CB, Vienna, Austria,
3) 2nd symposium on uncertainty evaluation to be discussed at next meeting.

(3) Other issues

DD Goodman reminded attendees of the issue on the D2 subscriber list, regarding which a concern was raised in earlier discussion. But there was no time for discussion. DD encourages each country member to review the D2 Mailing List to see who are on the list from your country and if anyone is not your NC member, urge them to become a member.

11. Future meetings

2002 D2 meeting

There were three proposals for 2002.

1) Schanda invites D2 to University of Veszprém, Hungary, connected with the workshop on displays in Budapest (see 10.2) and the possible D1 meeting in Maribor, Slovenia (~300 km from Veszprém) in fall.

2) Indian Society of Lighting Engineers (ISLE) invited D2 to New Delhi, India, in conjunction with Lux Pacifica in September,

3) There was a proposal for Davidson, North Carolina in conjunction with Oxford Conference in June.

Division members voted unanimously for Veszprém, Hungary for 2002. As the schedule of D1 meeting in Slovenia is not final yet, the details to be finalized after D1 meeting in Rochester in June. We will also try to have a joint meeting session with D1 either in Slovenia or Hungary.

2003 D2 meeting

Division 2 will meet in conjunction with CIE Quadrennial Session in San Diego in June - July 2003.

2004 D2 meeting

There was a suggestion to meet in Australia if NEWRAD takes place there (not decided yet). Other proposals are still welcome and a decision will be made at next D2 meeting.

12. Adjournment

The Division 2 meeting adjourned at 12 noon, May 19.

Attachment 1 Agenda of 2001 Div.2 Meeting
Attachment 2 List of Country Members (June 2001)
Attachment 3 Lists of TCs, Reporterships, Liaisons (June 2001)

Attachment 1

2001 Division 2 Meeting

NIST, Gaithersburg, USA

13:00 – 17:00 May 18, 2001 and 09:00 – 12:00 May 19, 2001

Agenda

1. Attendance list, apologies
2. Approval of agenda
3. Approval of the minutes of 2000 Division meeting
4. Director's report
5. Secretary's report
6. Editor's report
7. Progress reports from Technical Committees, reporters and liaison persons
   - 7.1. Associate Director Johnson and TC chairpersons
   - 7.2. Associate Director Sauter and TC chairpersons
   - 7.3. Associate Director Vandermeersch and TC chairpersons
   - 7.4. Reporters
   - 7.5. Liaisons with other organisations
8. Proposals for dissolution of TCs and reporterships
9. Proposals for new TCs and reporterships
10. General issues
    - 10.1. Experiences with TC draft documents on the website
    - 10.2. Discussion on future activities within D2 (symposia, potential CIE D2 'handbook', other initiatives)
11. Future meetings
    - 11.1. 2002
    - 11.2. 2003 (Quadrennial meeting)
    - 11.3. 2004
12. Any other business
13. Adjournment

Attachment 2

June 2001

Division 2 Country Members

ARGENTINA	Lic. Adrian J. Cogno	JAPAN	Ichiro Saito*
AUSTRALIA	Jim Gardner	NETHERLANDS	Anton J. Bouman
AUSTRIA	Michael Matus	NEW ZEALAND	John F.Clare
BELGIUM	Guy Vandermeersch	NORWAY	Björn Brekke
BRAZIL	Giorgio Moscati	POLAND	Jerzy Pietrzykowski
BULGARIA	V. Konstantinova	ROMANIA	Mihai Simionescu
CANADA	Joanne C. Zwinkels	RUSSIA	Raissa Stolyarevskaya
CHINA	Guan-Rong Ye	SLOVAK REPUBLIC	Josef Krempasky
CROATIA	Mrzljak Zeljko	SLOVENIA	Stanko Erste
DENMARK	Lars L. Larsen	SOUTH AFRICA	Franz Hengstberger
FINLAND	Tapani Timonen	SPAIN	Antonio Corrons
FRANCE	Jean Bastie	SWEDEN	Allan Ottosson
GERMANY	Georg Sauter	SWITZERLAND	Peter Blattner*
GREAT BRITAIN	Teresa M. Goodman	THAILAND	Surapol Vatanawong*
HONG KONG	T. M. Chung	TURKEY	Leyla D. Öztürk
HUNGARY	Gyula Dézsi	USA	Norbert Johnson
INDIA	Anool J. Mahidharia*	YUGOSLAVIA	Predrag Vukadin*
ITALY	Maria Luisa Rastello		

* Changes since April 2000.

Attachment 3

Technical Committees

June 2001

	Technical Committee	AD	Chair	
	TC2-04 Secondary standard sources	S	John	Moore
	TC2-16 Characterization of the performance of tristimulus colorimeters	S	Maria L	Rastello
	TC2-17 Recommendation for integrated irradiance and spectral distribution of simulated solar radiation	J	Dieter	Kockott
	TC2-19 Measurement of the Spectral Coefficient of Retroreflection	J	Norbert	Johnson
	TC2-23 Photometry of Street-Lighting Luminaires	V	Guy	Vandermeersch
	TC2-24 Users guide for the selection of illuminance and luminance meters	V	K.	Ganesha
	TC2-25 Calibration Methods and Photoluminescent Standard for Total Radiance Factor Measurement	J	Joanne	Zwinkels
	TC2-28 Methods of characterizing spectrophotometers	J	Peter	Clarke
	TC2-29 Measurement of detector linearity	S	Teresa	Goodman
	TC2-30 Array radiometry	J	James	Palmer
	TC2-32 Measuring Retroreflectance of Wet Horizontal Road Markings	J	Neil	Hodson
Std	TC2-35 CIE Standard for V(λ) and V'(λ)	J	Klaus	Mielenz
	TC2-36 Retroreflection: Definition and Measurement (Revision of CIE Publication 54, Liaison with CEN/226)	J	Justin	Rennilson
	TC2-37 Photometry Using Detectors as Transfer Standards	S	Yoshi	Ohno
	TC2-39 Geometric Tolerances for Colorimetry	J	Danny	Rich
Std	TC2-40 Characterizing the Performance of Illuminance and Luminance Meters	S	Reiner	Rattunde
	TC2-42 The Colorimetric Measurements for Visual Displays	J	Christine	Wall
	TC2-43 Determination of measurement uncertainties in photometry	S	Georg	Sauter
	TC2-44 Vocabulary Matters	J	John	Moore
	TC2-45 Measurement of LEDs - Revision of CIE 127	S	Kathleen	Muray
Std	TC2-46 CIE/ISO standards on LED intensity measurements	S	John	Scarangello
	TC2-47 Characterization and Calibration Methods of UV Radiometers	S	Gan	Xu
	TC2-48 Spectral responsivity measurement of detectors, radiometers, and photometers	S	George	Eppeldauer
	TC2-49 Photometry of Flashing Light	V	Yoshi	Ohno
	TC2-50 Measurement of the optical properties of LED clusters and arrays	V	Georg	Sauter
	TC2-51 Calibration of diode-array spectrometers	J	Richard	Austin
	TC2-52 Photometry of Emergency Lighting Luminaires	V	Guy	Vandermeersch
NEW	TC2-xx Multi-geometry color measurements of effect materials	J		Rössler
NEW	TC2-xx Review of IEC documents for color measurement and management in multimedia systems	J	Janos	Schanda

Std: TCs producing ISO/CIE standards

Document finished. To be closed soon.

Reporterships

June 2001

	Reporter Title	AD	Reporter	
	R2-05 Visual Gloss	J	Julie	Taylor
	R2-06 Standardization of Measuring Geometry for the Colorimetry of Metallic Coatings	J	Calvin	McCamy
	R2-21 Use of Detectors as Absolute Transfer Standards for Spectroradiometry	S	Nigel	Fox
	R2-23 ISO/CIE Standards for the measurement of reflectance and transmittance	J	Danny	Rich
	R2-24 Classification of Color Measuring Instruments	J	Yoshi	Ohno
	R2-25 Liaison with IALA	V	Ian	Tutt
NEW	R2-xx Eye Safety of Light Emitting Diodes	S	Teresa	Goodman
NEW	R2-xx Field Measurement for Traffic Signals	V	Carl	Andersen
NEW	R2-xx Evaluation of Colorimeter Spectral Responsivity	S	Balazs	Kránicz

Liaisons

June 2001

	Organization	Liaison Officer
	CCPR - Consultative Committee of Photometry and Radiometry	Rainer Köhler
	Division 8	Alan Kravetz
	ISO TC6 Paper, board & pulps	Joanne Zwinkels
	ISO TC 180/SC 1: Solar energy/Climate - Measurement and data	Dieter Kockott
	IEC TC 34: Lamps and related equipment	G. Vandermeersch
NEW	ISO on reflectance and transmittance issues	Danny Rich
NEW	IDA (International Dark Sky Association)	J. Rennison
NEW	OIML (Organization of International Legal Metrology)	Georg Sauter